Goddard Space Flight Center, Southwest Colorado Water Resources Team
Transcript for Earthzine VPS video
8/2/12

A (VO):

Show pictures/videos of flooding

Flooding is the most common natural disaster in the United States, and also has the largest number of presidential disaster declarations. Flooding causes nearly $7 billion per year in damage and takes an average of 90 lives per year in the US. In regions such as the midwest that experience snowfall, snowmelt can be an important factor in flooding. Snowmelt can provide water to regions,such as mountainous areas, that do not have many other water sources. But when does this…*(snowmelt video)* turn into this…*(flooding video)*?

Show title screen w/ names at bottom:

Southwest Colorado Water Resources: Snowmelt Modeling for Water Resources and Disaster Management Applications.

S:

My name is Scott Cook

A:

Alyssa Mathews

HP:

Harpreet Narang

S:

And we are part of the DEVELOP National Program team here at Goddard Space Flight Center, studying Colorado Water Resources.

A (VO):

Zoom into study area (Google earth video)

The study area for this project was the Upper Green River Basin in Southwestern Wyoming; part of the headwaters of the Colorado River. The Green River as a whole is the largest tributary into the Colorado River.

The Upper Green River Basin is a semi-arid region primarily consisting of sagebrush steppe that covers approximately 17% of the land in Wyoming. Effects on the Green River and Green River Basin will have direct and immediate impacts on the Colorado River.

S (VO):

Show map of RFC's nationwide, draw arrow to CRBRFC

We worked with our project partner, Andy Wood from the Colorado River Basin River Forecast Center in order to provide and test a model better suited to forecast snowmelt and its effects on rivers and flooding.

HP:

In front of hyperwall

Our objective for this semester was to run a snowmelt model called the Utah Energy Balance Grid Model. In order to run the model, we needed to properly process inputs using globally available data.

A:
At GSFC lake

The Utah Energy Balance (or UEB) Grid Model is an updated version of the Utah Energy Balance Model first developed by Dr. David Tarboton at Utah State University. The UEB is an energy balance based model, and uses energy exchanges between the air and the snowpack, as well as between the surface and the snowpack to determine snowmelt. We developed a multi-step methodology to obtain and process inputs that could then be used to run the model.

S(VO):

(Show methodology from PPT, click through inputs)

The UEB Grid model requires gridded meteorological and geospatial inputs, as well as some climatological data. On the left you can see the GIS inputs. They include a digital elevation model (DEM), slope, aspect, watershed, and ecological variables, such as land cover.

On the right you can see the meteorological data. All of this data came from the NASA's data assimilation package known as the Goddard Earth Observing System Version - 5 or GEOS-5. The inputs we needed did not have the correct time step or resolution. To account for this problem, we had to downscale the data from roughly 30km down to 250m. Downscaling is simply moving from a low resolution, to a higher resolution.

Now that the processing is complete, we will be able to use these inputs in the Utah Energy Balance model which will eventually be used as input into a broader hydrological model.

HP (VO):

Show movie of Aqua/Terra, TRMM, or ICESat in orbit (use NASA footage)

We used TRMM, ICESat, and MODIS products from both Aqua and Terra satellites to get some of our geospatial data.

HP:

In front of computer in office w/ ArcMap open, showing the DEM

Using ArcGIS, we processed a 90-m resolution digital elevation model (DEM) into 250-m resolution for our study area as a requirement for the UEB grid. We also used ArcGIS to derive other products, such as Slope, and Aspect. The remainder of our geospatial data inputs, such as Leaf Area Index, Canopy Height, and Canopy Cover were obtained from USGS, JPL, and other sources and clipped to our study area.

S (VO):

Show results slide with the 3 contour plots

We used a micromet downscaling script and mathematical corrections to acquire our original inputs into the correct resolution. On the left, you can see the original air temperature data from GEOS-5. The middle image shows downscaled data with a bilinear interpolation. On the right is downscaled temperature data with a Kriging interpolation, which accounts for both temperature and elevation change.

S:
At GSFC lake

We compared our downscaled and corrected data with data gathered at SNOTEL stations across our study area.

HP:
In front of building 29

We are currently in the process of finishing the UEB Grid model inputs, and beginning to run the model. For next term, our goal is to continue to test and validate the outputs from UEB Grid Model.

S:
In front of building 29

Eventually, we would like to use outputs from UEB model as inputs into other hydrological models for flood forecasting. We would also like to be able to run the model globally in near real time.

A:
In front of building 29

> Our hope is that the Utah Energy Balance Model will be an effective tool for nowcasting and forecasting floods, and be useful for both scientists and emergency managers in creating early warning systems.

Show Acknowledgements slide

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http://www.bottledvideo.com
http://www.freestockmusic.com
http://aqua.nasa.gov/doc/viz/media/aqua_terra_orbits.mov

Other sources:
http://areyouprepared.areavoices.com/2011/01/27/presidential-disaster-declarations/
http://www.usgs.gov/blogs/features/usgs_science_pick/the-anatomy-of-floods-cause-and-effect-and-the-epic-floods-of-2011/